given the shortfall in facilities estimated by Hatfield 3,[39] and the mis-match in the mapping of CBGs to actual wire center areas.[40]

C. The Cost Estimates Produced By A Cost Model Must Also Be Subjected To Close Scrutiny.

Ameritech (at 6) states: "the acid test of the validity of any cost study or proxy model is how well it estimates the actual or expected costs of production of real market participants." GTE agrees that the cost estimates produced by a model must be consistent to the costs of today's competitive telecommunications firms.

Given that MCI in particular uses the mantra of "ILEC inefficiency" based upon the claim that ILECs are "bloated monopolists" instead of "efficient" and "competitive" firms such as MCI, GTE supports U S WEST's suggestion (at 4-6) that a most helpful verification tool would be available if the Commission were to request the Hatfield 3 model sponsors to produce estimates of the level of their costs produced by their model. GTE agrees with U S WEST (at 5) that failure of the Hatfield 3 sponsors to volunteer such information for the Commission's use should serve as grounds for discarding Hatfield 3.

D. Because There Is No Documentation Of Input Sources Or Design Algorithms For Hatfield 3, And Thus No Capability For Rigorous Scrutiny, The Commission Must Reject Its Use.

The *Staff Analysis* (at ¶ 15) states the belief that "the algorithms and judgments made by a proxy model's designer or operator should be clearly identified and explained

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[39] *See* GTE's Comments at 50-52, and Attachment B at 6-8. These document the fact that Hatfield 3 fails to provide sufficient loop plant to cover the roadway lengths in CBGs studied.

[40] *Id.* at Attachment F.

so they can be independently evaluated by state or federal regulators." In response, MCI-AT&T Comments (at 8) claim that "[a]ll data, computations, and software associated with the [Hatfield 3] model are available to all parties for review" and that over 400 inputs can be examined and modified. Not only is this claim patently false, it fails to address the core issue -- the Hatfield 3 model sponsors have not provided documentation of either the basis for choosing the default inputs or the assumptions contained within the hard-wired computational algorithms.[41] Without such materials, and a fair opportunity for the Commission and interested parties to evaluate the reasonableness of the Hatfield 3's underpinnings, Hatfield 3 cannot be adopted by the Commission.

In the many state interconnection arbitration proceedings conducted in the past five months, GTE has attempted to gain an understanding of the myriad of assumptions underlying the Hatfield 2.2.2 -- many of which are largely carried over *en masse* to Hatfield 3. Unfortunately, despite its best efforts, GTE remains in the dark as to the basis of a large number of the economic and engineering assumptions used in the Hatfield 2.2.2 model. The scanty documentation provided for Hatfield 3 provides no better explanation.

Simply put, the Hatfield model's sponsors have failed to provide any meaningful support for their assumptions. These failures extend to virtually every aspect of the model, including cost of capital, joint and common costs, structure sharing, depreciation, annual cost factors, switching costs, service drop costs, installation factors, network operation factors, and so forth.

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[41] *See* U S WEST at 8-9 referencing write-protected calculations and algorithms.

This lack of supporting documentation became very evident in the arbitration proceedings. It was discovered that Hatfield Associates had prepared an "Input Summary," which described the "Support Material" for the Hatfield 2.2.2 default values.[42] As was soon readily apparent, the sole support for many of these values was listed as only "HAI Assumption," or "HAI Estimate," or "Determined During Discussions Between Hatfield, AT&T and MCI," or "Assumption Based on Industry Common Knowledge." Was it possible to verify these assumptions, estimates, and discussions? During the arbitration proceedings, GTE learned that it was not.[43]

For example, one of the principal methods by which the Hatfield model drives down costs is due to the fact that it drastically -- and arbitrarily -- slices huge amounts of investment, expense, and corporate costs from reported ARMIS categories. In California, for example, network investment is cut to 70%; switching investment to 41%; network expense to 41%; switching expense to 17%; and corporate expense to 40%. In the arbitration proceedings, the Hatfield witnesses could not provide justification. The witnesses were unaware of the reasons underlying these reductions and were only able to assume that they must be forward-looking estimates prepared by Hatfield Associates.[44]

To the extent there was justification for any of the above reductions, it related only to switching investment, and was based upon an absurd, data-poor, and non-verifiable

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[42] A copy of this summary is included as Exhibit B.

[43] *See* GTE's Comments at n.54.

[44] *See, e.g., Petition for Arbitration of an Interconnection Agreement Between MCImetro Access Transmission Services, Inc., and GTE Northwest, Incorporated,* WUTC Docket No. UT-960338, at 245-248 (December 3, 1996).

switching cost curve. The Hatfield 2.2.2 model plotted only three data points, and then fashioned a cost curve supposedly applicable to all switching costs.[45] Hatfield 3 apparently relies upon much the same method.[46] Not only is such a sample insufficient on its face, none of it could be verified.[47] Hatfield would not release its sources, claiming them to be proprietary.[48]

Hatfield 3 is even less verifiable than Hatfield 2.2.2. To GTE's knowledge, despite many new (and usually lower) default values, the Hatfield proponents have not even bothered to release an updated version of the Input Summary similar to that prepared for Hatfield 2.2.2; and the reason is obvious. The Hatfield modelers were criticized severely for the lack of verification evidenced by the Hatfield 2.2.2 Input Summary, and apparently did not wish to make that error again.[49] The Hatfield 2.2.2 black box is now a Hatfield 3 black box.

In many respects, the new assumptions are even less supportable than the earlier ones. For example, the Hatfield 2.2.2 Input Summary identified certain testimony of

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[45] *See* GTE's Comments, Attachment A, at 40-45, and Attachment B, at 12-14.

[46] *Id.*, Attachment B, at 12-14.

[47] A regression analysis based upon only three data points cannot be reliably used, regardless of the claimed degree of "fit." *Id.*, Attachment B, at 13, n.3. By comparison, BCPM used 130 data points.

[48] It is important to note that even the authors of the publication the Hatfield 2.2.2 modelers apparently relied upon for switching cost estimates "disclaims any ability to rely upon the information." SWBT at 24.

[49] For example, the Commonwealth of Massachusetts Department of Public Utilities stated that the Hatfield 2.2.2 model lacks verification and is without support. *Commonwealth of Massachusetts Department of Public Utilities Arbitration Order in NYNEX, AT&T, MCI Consolidated Proceedings*, at 21 (December 21, 1996).

R.L. Scholl of Pacific Bell as "support" for its assumption that all network operations expenses, including such static categories as power and testing, should be reduced by 30%. GTE obtained a copy of Mr. Scholl's testimony. Far from asserting that network operation expenses will be reduced 30% in the future, Mr. Scholl testified that the Hatfield model underestimated Pacific Bell's overall costs by $1.3 billion in California alone.[50] Undeterred by this mis-characterization of the testimony of Mr. Scholl, the Hatfield 3 now reduces network operation expenses to the 50% level. What is the support for this? In a very recent Washington Utilities and Transportation Commission ("WUTC") workshop, the model's principal architect, Robert Mercer, stated that he had heard that Pacific Bell believes that "forward looking network operations is more appropriately lower than even we've used, and on that basis we reduce its factor to 50 percent."[51] GTE is unaware of Pacific Bell's statement and looks forward to reviewing the supporting materials. But based upon GTE's earlier experiences with the Hatfield proponents on this issue, it remains skeptical of the credibility of this claim.[52]

Structure sharing is another area in which Hatfield 3 presents some revised, and even more fundamentally erroneous and indecipherable, assumptions. Hatfield 2.2.2 was

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[50] *Investigation on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643*, California Public Utility Commission Docket No. I.95-01-21, Testimony of R.L. Scholl, Universal Service Cost Proxy Models, at 11 (April 17, 1996).

[51] *Pricing Proceeding for Interconnection, Unbundled Elements, Transport and Termination, and Resale*, WUTC Docket No. UT-960369, Workshop Transcr. at 235 (February 14, 1997) ("*WUTC Proceeding*").

[52] It is illustrative that Pacific at 15 describes the Hatfield 3 approach as understating expenses by as much as "25% of actual."

criticized for its assumption that the telephone system would share its distribution structure equally with cable television and power lines.[53] Its proponents admitted, quite candidly, that there were no industry statistics or practices to support this assumption. Rather than correct the error, however, Hatfield 3 exacerbates it by now assuming that aerial distribution structures are shared by as many as four parties, *e.g.*, cable, power, and a competitive LEC ("CLEC"). No support for this revised assumption has been made available.

With respect to depreciation lives, Hatfield 2.2.2 based its depreciation assumptions on an existing Bell Atlantic-Maryland Public Utility Commission schedule.[54] The Hatfield proponents had to concede, however, that competition leads to innovation, which leads to shorter depreciation lives.[55] A number of the new depreciation lives displayed in Hatfield 3, however, are longer than those in Hatfield 2.2.2.[56] With regard to digital switching, the useful life is now assumed to be 16.54 instead of 14.3. *Id.* No support is provided for this assumption, which is not surprising. If the Hatfield proponents wanted to base their assumptions upon empirical data representative of an entrant into

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[53] *See* Florida Public Service Commission Order No. PSC-96-1579-FOF-TP, Docket Nos. 960833-TP, 960846-TP, 960916-TP, at 29 (December 31, 1996).

[54] *See* Testimony of Don J. Wood, Consultant for MCI, Deposition, Docket Nos. 960847-TP & 960980-TP, Exhibit 2, at 1 (October 1, 1996).

[55] *MCI Telecommunications Corporation's Petition for Arbitration Pursuant to Section 252(B) of the Telecommunications Act of 1996 to Establish an Interconnection Agreement with GTE North Incorporated and GTE North Incorporated of Indiana (Formerly Contel of Indiana Inc.)*, Indiana Utility Regulatory Commission Cause No. 40603-INT-02, at A-125 (October 31, 1996).

[56] *See* GTE's Comments, Attachment B, at 21.

the local exchange market, they would have had to use a much lower useful life: AT&T assumes that the life of a digital switch is 9.7 years. *Id.*

There are many more examples of the inaccessible and unverifiable nature of Hatfield 3, but the point is obvious. The inherent assumptions and structure of the Hatfield model are not based upon empirical data, and are not available for scrutiny. Rather, they are based upon assumptions fed into the model by its proponents, AT&T and MCI. These entities have assured that Hatfield 3 will spin out low interconnection prices because they have salted it with low-ball input prices -- and have shielded themselves from empirical verification by providing nothing to examine. U S WEST (at 12) says it best: "A data-free environment allows for optimal manipulation."

In fact, Hatfield 3 still does not work properly. The Hatfield 3's principal architect, Robert Mercer,[57] admitted only ten days ago that Hatfield 3 still needs adjustment: "[W]e're [still] tweaking the model and getting it to run right."[58] This it-isn't-perfect-but-we're-working-on-it argument has been used repeatedly by the Hatfield modelers -- with respect to versions 2.2.1, 2.2.2, and now 3.0. In state arbitration proceedings GTE has repeatedly heard these arguments, repeatedly pointed out the many flaws that are observable even to those without detailed knowledge of the then-touted versions, and repeatedly heard the we're-working-on-it response from Hatfield Associates.[59]

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[57] Dr. Mercer's degree is in physics, not economics, and he had never created any cost model prior to the Hatfield Model. *See MCI v. GTE California Arbitration*, Docket. A.96-09-012, Transcr. Day 2, at 220, 313-14, and Exhibit 102, at 1.

[58] *WUTC Proceeding* Transcr. at 263.

[59] See BellSouth at 2 discussing the "continuous state of change" of the models.

The more GTE learns about the latest version of the Hatfield model, the worse it looks. It should be no surprise, then, that the models' architects and proponents have failed to give this Commission -- or others -- the tools needed to review the source materials for the model's assumptions and inputs.

III. THE NUMEROUS KNOWN FLAWS RENDER THE HATFIELD 3 MODEL BEYOND REPAIR.

GTE's Comments (at Attachment A and B) and those of numerous other parties have shown conclusively that Hatfield 3 is beyond repair. For example:

- It does not account for growth in demand by constructing a network in indivisible increments.[60]
- It fails to consider either uncertainty of demand or service quality needs by using excessive levels of utilization.[61]
- It does not accurately map Census Block Groups (CBGs) to the appropriate wire centers.[62]
- It does not correctly design loops. Hatfield 3 designs a network incapable of providing the quality of narrowband service a majority of customers currently enjoy -- one capable of transmitting voice signals when long loops exist, and one capable of supporting modems of greater than 9.6 kbps speed.[63]
- It assumes that a Digital Loop Carrier (DLC) will be placed at 9,000 feet from a wire center, but does not vary that distance if the total loop length is very long,

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[60] *See*, BellSouth Attachment 1, at 2. *See also*, Bell Atlantic-NYNEX Exhibit A, at 2-4.

[61] *See* SWBT at 20; Ameritech at 20.

[62] *See* GTE's Comments at Attachment F.

[63] *See* GTE's Comments at 31-32 and n.49. WorldCom at 32 describes a "proper loop design" as relying on 100% copper facilities for loops up to 18,000 feet long, *i.e.*, 15,000 feet of 26 gauge cable and 3,000 feet of 24 gauge cable, and no load coils. WorldCom is wrong. The resistance of a non-loaded loop designed in that manner may be acceptable, but the signal loss (measured in Decibels) will be outside the normally used 8 dB loss specification.

potentially resulting in a relatively short amount of fiber to the DLC and a very long copper loop connecting the customer to the DLC.[64]

- It "constructs" coarse gauge cables (*i.e.*, cables of 22 or 19 gauge) in sizes that are not manufactured.[65]It does not optimize network design over time using a mixture of old and new technology.[66]

- It fails a linear homogeneity test, *i.e.*, a uniform change in inputs does not produce a matching proportional change in outputs.[67]

- It proposes unrealistic amounts of sharing of support structure,[68] yet does not include coordination costs or additional costs for larger trenches.

Thus, the Hatfield 3 is so fundamentally flawed that it cannot be used for any of the purposes which the Commission desires.

IV. THE COMMISSION MUST TAKE STEPS TO IMPROVE THE ACCURACY OF COST PROXY MODELS.

For reasons described *supra*, in GTE's comments, and by many other parties in this proceeding, the general class of cost proxy models will never allow the Commission to estimate the market price of basic local service (or of other services, such as access, or of UNEs) based solely on the model's output. Simulation models are inherently unreliable as a means of estimating average cost levels because the models do not correctly specify the nature of forward-looking cost. The models are simplifications of reality; even if well-designed, they will still predict cost only with some error. Finally, the

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[64] WorldCom at 32 also correctly identifies this flaw in the Hatfield 3.

[65] *See* GTE's Comments, Attachment B, at 8-9.

[66] *See* USTA at 9.

[67] *See* GTE's Comments, Attachment A, at 67-71. *See also,* Ameritech at 11.

[68] *See* WorldCom at 38: Hatfield 3 "assumes an unrealistic proportion of sharing between electric, gas and telecommunications services on various structures."

models contain significant errors in their inputs and assumptions. GTE has suggested in its comments how the Federal universal service plan should be structured to ensure that it is robust; *i.e.*, to ensure that the inevitable model errors do not prevent the Commission from implementing a plan which satisfies the requirements of the 1996 Act.

GTE nonetheless agrees that if a model is chosen for the limited use suggested be GTE, it should be as accurate as possible. This is useful to minimize the amount of adjustment needed to ensure that the model output agrees with actual data. Further, the model will, in any case, be relied on to supply information about the relative cost of different CBGs within a study area, and this information should be as accurate as the Commission can make it.[69] For these reasons, GTE has proposed a series of steps the Commission should take to improve the accuracy of the cost proxy models. Of course, the reasonableness of all of the model inputs should be verified; GTE has discussed many of these *supra* as part of the discussion of validating the model. Here, specific changes that can further improve the model will be summarized. As an overall point, the models themselves are static, and do not address the "dynamic optimization problem" all firms face. While the Commission, within the limits of time and resources, cannot make the models dynamic, it can adopt approaches which will allow the static models to more accurately reflect the result of a dynamic optimization.

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[69] As a threshold matter, it should be noted that it is not strictly necessary for the Commission to adopt a proxy model as part of its plan, if it adopts the "price cap" approach, discussed at n.24 *supra*, to determine the relative price levels across CBGs.

GTE does not sponsor any particular model. Moreover, all of the available models share the inherent limitations described *supra*.[70] On balance, however, the BCPM produces estimates that are closer to the cost levels likely to be experienced by a firm in the real world. In a number of areas, its assumptions are more realistic than those of competing models. For these reasons, GTE proposes that the suggestions listed here for model improvements should be applied to the BCPM, since it is the most promising basis from which to work.[71] The Hatfield 3 model, in contrast, fails even the simplest tests of reasonableness, and does not provide a sound basis for applying improvements with any hope of achieving a useful result. The Hatfield 3 model should not be adopted by the Commission for any purpose.

GTE proposes that the Commission should implement the following improvements:

A. The Model Should Use Accurate Line Counts At The Wire Center Level.

All of the existing proxy models estimate the number of lines served by each wire center based on the household data from the CBGs which are assigned to that wire center, and on employment data. As the *Staff Analysis* (at ¶ 26) recognizes, this can

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[70] Note that some of the firms that do sponsor a particular model are nonetheless careful to recognize the model's limitations, and to caution against using the model for purposes to which it is not suited. *See*, U S WEST at 6-11, Pacific at 4-8.

[71] A last minute entry is the model developed by Ben Johnson Associates. GTE has not had the opportunity to analyze the Ben Johnson model as thoroughly as it has the other proposed models, and has therefore refrained from offering a detailed critique of the model in its comments. However, GTE's preliminary evaluation suggests that the Ben Johnson model is not, as it stands, suitable for use in the Commission's universal service plan.

leads to errors in the number of lines. GTE demonstrated in its comments that, in the case of Hatfield 3, these errors can be quite spectacular.[72] GTE submits that it is unnecessary to estimate line counts by wire center since ILECs already maintain these data.

GTE proposes that the total number of residence lines in each wire center be set using the actual residence line count for that wire center. This total should then be distributed to the CBGs assigned to the wire center on the basis of the relative number of households in each CBG. This method would automatically correct for differences across wire centers in penetration, and in the prevalence of second lines. Similarly, the total number of business lines in the wire center should be based on the business line count for that wire center; that total should be distributed to the CBGs on the basis of relative employment in each CBG. This will automatically correct for differences across wire centers in the number of lines per employee.

While individual ILECs may regard line count information as proprietary, GTE suggests that the Commission could make use of such data under an appropriate protective agreement.[73] Such an agreement could provide the opportunity for the

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[72] For example, GTE's Comments, Attachment A, at 15 show that Hatfield 3 assigns 14,090 total access lines to a GTE wire center in Thousand Oaks (CA) that actually serves 38,058 total access lines. *See also* SWBT at 20: almost half of SWBT's wire centers in Texas have errors of 10% or more. These large errors persist, despite claims by Hatfield's sponsors that Hatfield 3 takes account of differences in line demand more accurately (MCI-AT&T Comments at 14).

[73] In the context of switching input costs, Sprint at 9 urges the Commission to use proprietary data obtained under protective order, and the reasons cited by Sprint apply with equal force here.

Commission staff to review the information, and for an independent auditor to verify that the line counts are correct.

B. A Model Should Assume Facility Utilization That Is Consistent With Optimization Over Time By A Real Firm.

GTE (at 52-60) described the factors that would influence the level of utilization an efficient firm would choose to minimize its cost over time. These include growth, uncertainty, the presence of indivisibilities, expected changes in input prices, and tradeoffs with maintenance and rearrangement costs. None of the models considers these factors.[74]

While the parties disagree as to the fill inputs that should be used, the simple fact is that there is no fill assumption that can be shown to be reasonable *a priori*. That is because each model is, in effect, a transform that takes the input fill assumptions and turns them into a realized fill in the model's output.[75] GTE has referred to this result as the "static fill." The "static fill" depends, not only on the assumed input fill, but also on

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[74] The Hatfield sponsors claim that Hatfield 3 considers tradeoffs between building plant now to accommodate demand growth, and waiting to add capacity later. MCI-AT&T Comments at 15. Yet there is nothing in the model that would actually perform this optimization.

[75] SWBT at 20 discusses the problem of representing optimal fill over time in a static model. GTE agrees with SWBT that the fill assumptions in the current models do not consider growth or other factors. Given SWBT's assumptions, the arithmetic examples SWBT offers correctly show the effect of growth on the capacity that must be placed. However, these observations do not lead directly to a set of input fill assumptions, because the model will produce a fill in its output which is different from the input assumption. Further, the calculation offered by SWBT assumes (as the models do) that all equipment is placed at once. GTE proposes *infra* that this assumption should be relaxed. This will allow the model to be consistent with the observed data, which was generated by firms placing optimal increments to capacity over time.

the way the model represents the feeder and distribution network. Particularly with respect to distribution, the "static fill" reflects the way the model represents the pattern of local streets, and the effect of rounding up to the next cable size. But since the pattern of local streets lies below the level of the model's unit of observation (the CBG), the transformation the model makes between input fill and static (output) fill is entirely arbitrary -- it reflects the model builder's choices, rather than any actual information.

Further, the process in the model that creates the difference between input fill assumptions and the static fill in the model's output is nothing like the process through which a design fill (together with the optimal increment to capacity) determines the actual fill achieved in the real world. Thus it is not reasonable to use the real-world design fill as the model's input, in the expectation that the model's output will accurately reflect the real achieved fill.

In fact the only information the Commission has which represents the actual optimization problem firms face in choosing utilization levels is the fill actually observed in real-world networks over time. For this reason, GTE proposes that the input fill assumptions in the proxy model should be the one that cause the model to produce a "static" fill that approximates the actual fill in real networks.[76] GTE showed that this actual fill is about 30%-40% for distribution, and 65% for feeder, for an average actual fill for feeder and distribution combined of about 55%. The input values which produce

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[76] U S WEST recognizes correctly that the actual fills achieved in real networks provide the only observable information about the fill levels that minimize cost over time. However, U S WEST at 24 suggests that these values should be used as inputs. In fact, since the model itself will change the realized fill, the only way to reflect the data correctly is to force the model's output to match the actual fills.

this result should be found by running the model in an "open-loop" fashion, varying the fill assumptions until the desired static fill is achieved in the model output.

C. A Model Should Use A Reasonable Assumption Of Market Share.

The current proxy models implicitly assume that the "efficient entrant" will be able to serve 100% of the demand in the market upon entry. Note that, since the models consider economies of scope with local business lines and private lines, the model assumes that the entrant could instantly capture that demand as well. Clearly there is no plausible entry scenario under which this would occur. Given this fact, the Commission should use extreme care in using the model estimates, particularly if they are lower than the incumbent's actual cost.

GTE has developed estimates of the effect of changes in market share on the cost estimated by the models. For this purpose, the BCM2 model was used.[77] In each CBG modeled, the number of lines served was decreased, first to 65% of the current total, and then to 50%. It was assumed that the carrier could not know in advance which subset of customers would choose its services; in order to meet its universal service obligations, the carrier would have to build to serve the entire CBG.[78]

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[77] BCM2 was used because the BCPM was not available in time; there is no reason why a similar analysis could not be performed using BCPM.

[78] The total number of route-miles constructed by the model was the same regardless of whether the market share was 100%, 65%, or 50%. The model was allowed to provide less capacity on each route to reflect the reduced demand; however a slightly lower fill was assumed, since the carrier would presumably want to be able to supply additional customers it might capture from its rivals. *See* GTE *D.96-45 ex parte* of February 20, 1997.

The effect on the firm's cost was significant. When the analysis was performed for GTE's serving areas in Washington state, the results were as follows:

Cost per line at 100%	$39.14
At 65%	$50.65
At 50%	$59.73

These results suggest that the model, when it assumes that one carrier will serve 100% of the market, substantially underestimates the cost any firm would experience in a competitive market. It certainly underestimates the cost of an efficient entrant, that would begin with much less than 50% share. WorldCom acknowledges (at 33) that "the models assume that whatever firm is associated with a particular wire center will have a monopoly and serve all of the customers in the census blocks closest to those wire centers. In reality, new entrants and incumbent firms can each be expected to serve a portion of the total market demand." GTE submits that the model estimates should reflect this reality.

AT&T-MCI Comments (at 16) claim that the loss of demand to entrants will not rob the incumbent of any scale economies, because the entrant will resell services or elements purchased by the incumbent. This is circular reasoning. When the model predicts costs lower than the ILEC's current cost, this supposedly reflects the ability of an "efficient entrant" to produce at the lower cost. Yet now we are told by the Hatfield 3 sponsors that the underlying supply will actually come from the ILEC network. If this is the case, the cost of that supply cannot be lower than that of the ILEC, and there is no basis for setting the price at which that supply is sold at a price lower than the ILEC's actual cost.

In fact, the surest way to preempt facilities-based entry is to arbitrarily set the price at a level that is below the cost of either the incumbent, or of an efficient entrant. When using the model, the Commission should ensure that the market share assumptions on which the model is based are reasonable. As AT&T-MCI and WorldCom both recognize, assuming that one firm will serve 100% of the market is not a reasonable assumption. At the very least, the Commission cannot adopt a cost estimate which is less than the current actual cost of the ILEC, based on a model which assumes that the efficient entrant will serve 100% of the market. If it is true, as AT&T-MCI suggests, that entrants will rely on resale of the incumbent's network, then the price of the final service, as established by the universal service plan, should reflect the ILEC's cost.

D. A Model's Use Of Engineering Rules Of Thumb Should Reflect Optimal Capacity Placement Over Time.

As GTE (at 52-54) showed, it will not generally be optimal for a carrier to place enough capacity at the outset to serve all demand over some long-run planning horizon. Instead, the firm will choose a trigger point (the design fill); whenever that level of utilization is reached, the firm will add an increment of capacity. The size of that increment will be chosen, along with the design fill, to minimize cost over the planning horizon.[79]

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[79] MCI-AT&T Comments acknowledge at 15 that "when plant is originally placed, demand may be fairly small and require only fairly small switches and cable. However, over the life of the network cable, the neighborhood may grow, and additional cable or more switch capacity may be needed." For a discussion of the factors affecting the optimization over time, *see* U S WEST at 21-24 and at Appendix D.

Since the models are not dynamic, they do not represent the result of this optimization over time. In effect, because the models have no time dimension, they implement a rule of thumb that calls for all network investment to be made at once. This rule is not representative of best industry practice; nor would it lead to a least-cost network design over time. The best industry practice is to place an optimal increment of capacity at optimal intervals.[80] GTE proposes that the model should reflect this best industry practice. For example, if the total number of pairs ultimately required on a route is 1200, this might be satisfied by placing three cables of 400 pair each over time. For each application, the model's assumptions should reflect widely used planning guidelines which would determine capacity placement.[81]

Note that the results that would be captured by a dynamic model cannot be replicated simply by adjusting the assumed level of fill.[82] In the example given here, three 400 pair cables would cost more than one 1200 pair cable. More importantly: (i) placement costs would be incurred three times, rather than just once; (ii) three cable

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[80] *See* Pacific at 11: A "prudent investment strategy requires that the network be deployed in stages as demand materializes."

[81] The numbers used here are illustrative. For a given total demand, the current models look up a necessary cable size. To do this, they take into account the sizes available, rounding to the next size, and the possibility of combining a small cable with a larger one to minimize the effect of this rounding up. What GTE is proposing is a modification to this algorithm which would call for multiple placements as a function of the type of facility (feeder or distribution) and the size of the total demand. Thus, while the results would be different, GTE's proposal does not call for a significant increase in the model's complexity.

[82] SWBT, for example, suggests at 22 adjusting fill assumptions to replicate a dynamic optimization. While SWBT's analysis of fill is correct as far as it goes, it does not include the effects on facility sizes and placement costs.

sheaths would involve a higher level of maintenance; and (iii) support structure requirements would increase as well.[83]

MCI-AT&T Comments (at 15) suggest that because the Hatfield model is a "unit cost" model, it builds additional capacity only if the cost of building it today is less than the cost of building twice. If dynamic optimization is built into the model in this fashion, it is a closely guarded secret. In fact, the model is static. It does not consider the cost of adding capacity later; nor does it consider the cost of capacity in place now to allow for growth. While MCI-AT&T Comments suggest (*id.*) that the cost of allowing for real-world conditions should somehow be deferred to some future group of customers, the simple fact is that minimizing network cost over time benefits all customers.[84] The inadequacy of Hatfield 3 is not that it defers costs, but rather that there are real costs that the model simply ignores.

The same consideration applies equally to switches. Here, as MCI-AT&T Comments (*id.*) recognize, capacity also must be added over time to meet demand, and the price of additions to the switch will usually be higher than an equivalent amount of capacity bought when the switch is new. GTE suggests that this difference should be recognized by using an average cost calculated over the "life-cycle" of the switch by

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[83] Support structure costs for buried cable would be directly proportional. Costs for underground cable would only deviate from a direct proportion if later cables were sufficiently small to be placed in the same duct as an earlier cable. For smaller distribution cables, aerial structure costs would be largely independent of number of placements.

[84] The reason today's customers have capacity in place to serve them immediately is that ILECs, in placing capacity in the past, have included sufficient capacity to allow for growth to today's demand level. Further, absent sufficient stand-by capacity, service quality standards cannot be maintained in the event of a cable failure.

assuming a percentage of the total capacity the switch will have over the planning horizon that will be added after the initial purchase of the switch.

E. A Cost Model Should Estimate Operating Expenses Levels Using Generally Accepted Statistical Forecasting Methods.

GTE (at 97-100) suggested that forward-looking operating expenses should be estimated by applying generally accepted statistical forecasting methods. U S WEST (at 30) agrees with this basic premise: "No company plans for the future by ignoring the past. Past experience trended for projected changes is the only means by which a company operates its business." U S WEST (at 31) also concurs with GTE that "[a]ny adjustment to expenses should require some form of empirical justification."

Because these expenses are generated by fairly regular underlying processes, they are unlikely to change suddenly on a discontinuous basis, even though they may evolve over time due to changes in technology or in input prices. Forecasting expenses would be consistent with the approach the Commission has employed in the context of price cap regulation, wherein it forecasts productivity factors one year at a time. Thus, the Commission should require that any model it adopts use standard statistical forecasting techniques to estimate operating expenses.

This empirical approach to estimating forward-looking expenses would base the Commission's estimate on factual data, and not merely on the assertions of some

parties that expenses in the future will be dramatically lower than expenses are today.[85] Further, if estimated correctly, this approach would also help to insulate the model results from the particular structure chosen by the model builder.

In the Hatfield 3 model, where expenses are estimated through the use of factors, underestimating the underlying amount (such as investment) will cause a corresponding reduction in exponses. Thus, even if the factors in Hatfield might appear to account for all expenses when they are calculated (which they do not), they will underestimate expense when they are actually used in the model. The BCPM avoids this problem by estimating expenses on a per-line basis. However, this approach assumes that the expense level is the same for all lines, which clearly is not true. Actual expenses vary across lines, but are generally not driven by the level of investment in each line. Instead, many are driven by specific activities, such as the need to have a service technician to maintain a switch. Others are related to the size of a given local serving area. Therefore, neither a per-line structure nor a factor approach will reasonably capture the true differences in expense levels across areas.

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[85] The only party that has seriously attempted to estimate forward-looking expenses is the group of BCPM sponsors. Expenses in the BCPM reflect estimates of forward-looking expenses provided to the BCPM modelers by a group of ILECs. However, these are estimated on uniform per-line basis. GTE discusses *infra* the problems with this structure. Further, since the BCPM has no time dimension, it is not clear what future changes the BCPM is attempting to forecast. GTE's proposal addresses this last difficulty be treating the forecasting problem one year at a time. For setting prices this year, the problem is to forecast the likely level of expenses last year. The problem is similar to the one the Commission has already dealt with in price caps. As in price caps, it makes more sense to update an annual forecast, one year at a time, than to try to create an "all purpose" forecast for some unspecified future period.

GTE recommends first, that expenses be forecast on the basis of generally accepted forecasting methods, and second, that serving areas be stratified for the purposes of estimation, to capture any differences in expense levels. GTE proposes that the stratification should be by size of study area, and by density.

F. Cost Model Estimates Of "Customer Care" Expenses Must Be Consistent With "Avoided Cost" Findings By State Regulatory Agencies.

GTE (at 107-108) suggested the Commission could compare the amount of retail "customer care" expenses estimated by a model with the "avoided cost" findings of state regulatory agencies as a test for consistency between the two estimates. GTE's postulate was that the amount of expense should reasonably be the same whether an ILEC retains or loses a customer. U S WEST (at 33-38) and Bell Atlantic-NYNEX (at 15) also supports consistency between "avoided cost" estimates and expense estimates of the models.

The Hatfield 3 proponents have argued in state arbitration proceeding for "avoided cost" discounts greater than 30%.[86] Given the dramatic reduction in expenses estimated by Hatfield 3, in particular,[87] the Commission should insist that the expense estimates of any model adopted can be reconciled with the "avoided cost" findings in state commission proceedings.

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[86] *See, e.g.*, Petition of AT&T Communications of the Southwest, Inc. for Compulsory Arbitration to Establish an Interconnection Agreement Between AT&T and GTE Southwest, Inc. and Contel of Texas, Inc., Public Utility Commission of Texas Docket No. 16300, Direct Testimony of Art Lerma, at 4, lines 11-13, recommending at 32.58% avoided cost discount.

[87] *See, e.g.*, Pacific at 15 describing the Hatfield 3 approach as resulting in expenses that are as much as "25% of actual."

CONCLUSION

The Commission must recognize the limited usefulness of any cost model, and particularly the inappropriateness of setting prices for access charges and for universal service equal to the cost estimate produced by models under consideration in this proceeding. The Commission cannot use cost estimates to prescribe prices for UNEs because the plain terms of the 1996 Act assigns that task to state regulatory agencies. GTE does support the limited use of a properly designed cost model that employs real-world inputs and proper network design algorithms for the purpose of identifying relatively high-cost areas that should receive universal service support.

The Hatfield 3 model is so fatally flawed as to be worthless even for this limited purpose. Thus, the Commission should direct its efforts to revise the BCPM model along the lines discussed *supra*.

However, because cost models can never replicate the dynamic optimization process in which real-world firms engage, or reproduce a market-derived price level, the Commission must recognize that: (i) even the best model will be a gross simplification of real life; (ii) real-world actual costs must serve as the standard of comparison for

model estimates; and (iii) prices must be based upon the actual costs experienced by firms in competitive markets.

Respectfully submitted,

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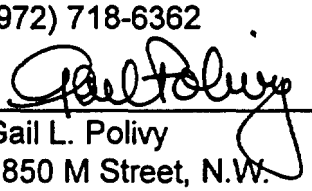
By 

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EXHIBIT A

INDETEC International

Hatfield Model 3.0 Analysis

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